

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

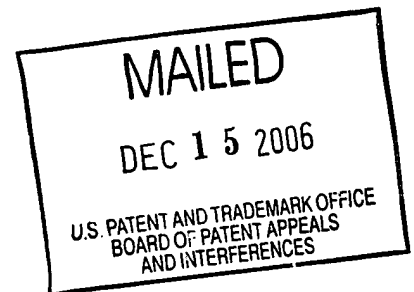
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FERNANDO GONZALEZ and CHANDRA MOULI

Appeal No. 2006-3039
Application No. 10/751,141

ON BRIEF



Before KRASS, JERRY SMITH, and HOMERE, Administrative Patent Judges.

JERRY SMITH, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal under 35 U.S.C. § 134 from the examiner's rejection of claims 12-25, which constitute all the claims pending in this application.

The disclosed invention pertains to a transistor with vertical junction edges. The transistor is fabricated by forming trenches in a substrate and filling the trenches with an oxide material. Shallow cavities are formed in the oxide material and are filled with a polysilicon material to form the drain and source terminals respectively. Vertical junctions are formed between the polysilicon and the exposed substrate at the trench edges.

Representative claim 12 is reproduced as follows:

12. A transistor comprising:

a drain terminal comprising a doped polysilicon material disposed within a first shallow cavity formed in an isolation oxide region;

a source terminal comprising a polysilicon material disposed within a second shallow cavity formed in the isolation oxide region;

a channel formed in a silicon material and arranged between each of the first shallow cavity and the second shallow cavity, wherein the channel comprises a respective doped region coupled to each of the drain terminal and the source terminal; and

a gate disposed over the channel and comprising one or more conductive layers disposed over a gate oxide layer.

The examiner relies on the following references:

Tsuchiaki	6,271,566	Aug. 7, 2001
Michejda et al. (Michejda)	2002/0190344	Dec. 19, 2002

The following rejections are on appeal before us:

1. Claim 12 stands rejected under 35 U.S.C. § 102(e) as being anticipated by Michejda.

2. Claims 13-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over

Michejda in view of Tsuchiaki.

Rather than repeat the arguments of appellants or the examiner, we make reference to the briefs and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in

reaching our decision, the appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the disclosure of Michejda does not fully meet invention as set forth in the claim 12. We also find that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the obviousness of the invention as set forth in the claims 13-25. Accordingly, we reverse.

We first consider the examiner's rejection of claim 12 under 35 U.S.C. § 102(e) as being anticipated by Michejda. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984); W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983). Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the briefs have not been considered and are deemed to be waived [see 37 CFR § 41.37(c)(1)(vii)(2004)].

The examiner has indicated how the claimed invention is deemed to be fully met by the disclosure of Michejda [answer, pages 3 and 4]. Appellants argue that Michejda does not disclose shallow cavities formed in an isolation oxide region as claimed. Rather, Michejda forms isolation structures 150 inside trenches formed in the semiconductor substrate. Doped material is then deposited on top of the isolation structures [brief, page 6; reply brief, pages 2-4]. In short,

appellant argues that no cavities exist in the isolation structures; therefore, no material can be deposited in such non-existent cavities [reply brief, page 5].

In response, the examiner refers to Figures 7-18 of Michejda that illustrate the process of forming the semiconductor device. Specifically, the examiner contends that doped polysilicon materials 1010 are formed in the isolation oxide regions 810, 510 that are disposed within trenches 410, 415 [answer, page 9]. The examiner then contends that the doped polysilicon material is disposed within a shallow cavity formed in the isolation oxide region [id.].

We will not sustain the examiner's anticipation rejection of claim 12. We simply fail to see how a cavity is formed in the isolation oxide region of Michejda, let alone depositing polysilicon material in such a cavity as claimed. Turning to representative Figs. 1A and 12 of Michejda, we agree with the examiner that polysilicon material that forms the source and drain regions is deposited on isolation oxide structures 150, 810. As shown in the figures, isolation structures 150, 810 have a contoured, mound-like profile.

But we fail to see a cavity in these mound-shaped structures or any other structure in Michejda that the skilled artisan would reasonably construe as a cavity in the isolation oxide region as claimed. A cavity is "a hollow space within a solid object."¹ Although the contoured isolation regions 150, 810 may taper towards their ends, such a contour hardly forms a hollow space that would reasonably constitute a cavity given the plain meaning of the term.

Furthermore, we disagree with the examiner's suggestion that the combination of the isolation regions and the oxide layers that are adjacent to the isolation regions somehow forms a cavity in the isolation oxide regions. Although oxide layers 160, 510 are directly adjacent to

¹ Compact Oxford English Dictionary, at http://www.askoxford.com/concise_oed/cavity?view=uk (last visited Nov. 17, 2006).

isolation structures 150, 810 we fail to see how such a combined structure reasonably constitutes a cavity formed in the isolation oxide region as claimed.

As appellants indicate, the isolation structures of Michejda are formed within trenches in the semiconductor substrate into which polysilicon material is deposited. Claim 12, however, specifically calls for disposing polysilicon material within cavities formed in the isolation oxide region. In essence, the claim requires disposing polysilicon material within a hollow space within the isolation oxide region. Even if we construe the trenches formed in the semiconductor substrate of Michejda as cavities, at best, the reference merely teaches depositing polysilicon material in cavities formed in the semiconductor substrate – not in the isolation oxide region as claimed.

For the above reasons, Michejda does not expressly or inherently disclose all limitations of claim 12. Accordingly, we will not sustain the examiner's anticipation rejection of that claim.

We next consider the examiner's rejection of claims 13-25 under 35 U.S.C. § 103(a) as being unpatentable over Michejda in view of Tsuchiaki. In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). The examiner must articulate reasons for the examiner's decision. In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002). In particular, the examiner must show that there is a teaching, motivation, or suggestion of a motivation to combine references relied on as evidence of obviousness. Id. at 1343, 61 USPQ2d at 1433-34. The examiner cannot simply reach conclusions based on the examiner's own understanding or experience - or on his or her assessment of what would be

basic knowledge or common sense. Rather, the examiner must point to some concrete evidence in the record in support of these findings. In re Zurko, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Thus the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion. However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. In re Kahn, 441 F.3d 977, 987-88, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) citing In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). See also In re Thrift, 298 F. 3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. See In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Independent claims 17 and 22 recite limitations commensurate to those previously discussed with respect to claim 12 – namely disposing polysilicon material within cavities formed in the isolation oxide region. Although the examiner adds Tsuchiaki to Michejda,

Appeal No. 2006-3039

Application No. 10/751,141

Tsuchiaki does not cure the deficiencies of Michejda that we noted previously.² Accordingly, the obviousness rejection of claims 13-25 over Michejda and Tsuchiaki is also not sustained.

In summary, we have not sustained the examiner's rejection with respect to any of the claims on appeal. Therefore, the decision of the examiner rejecting claims 12-25 is reversed.

² See pages 4-6, supra, of this opinion.

REVERSED

ERROL A. KRASS)
Administrative Patent Judge)

Jerry Smith
JERRY SMITH
Administrative Patent Judge

BOARD OF PATENT APPEALS AND INTERFERENCES

Jean R. Homere
JEAN R. HOMERE
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Appeal No. 2006-3039
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